SECTION III
OPERATION

3-1. INTRODUCTION

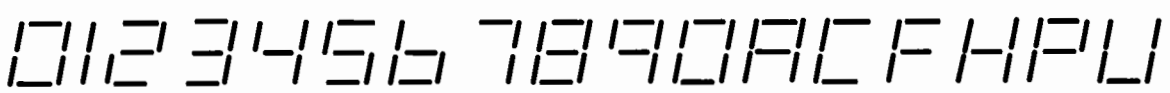
3-2. This section explains the functions of the operating controls, indicators, probe, and test connectors of the 5004A Signature Analyzer. An operator's self-test is given, and the normal operating modes are described.

3-3. PANEL FEATURES

3-4. Front panel features of the Signature Analyzer are described in *Figure 3-1*. This figure contains a detailed description of the controls, connectors, and indicators.

3-5. SIGNATURE DISPLAY

3-6. The 5004A Signature Analyzer presents digital signatures with a four-character (symbol) display on its front panel. Each character, which can be any one of 16 symbols, is shown on a 7-segment light-emitting-diode display 10 by 7 millimetres. The 16 possible characters are:



3-7. The characters presented on the display are a hexadecimal number which is the residue of a count in the 5004A after a START and a STOP signal have been received with some data bits in between.

NOTE

No signature appearing on the 5004A display has any particular significance beyond being a correct (expected) signature or an incorrect signature. The number is, however, a count residue in the 5004A converted to and displayed in hexadecimal.

3-8. HEXADECIMAL NUMBER SYSTEM SYMBOLS (DIGITS)

3-9. The four-digit front panel display presents numbers in a special set of hexadecimal symbols (see preceding paragraph). Note that the final six symbols are not the common hexadecimal symbols ABCDEF because the seven-segment display of the 5004A can not show a B or D that would be different from an 8 or Ø respectively (and several other symbols could be ambiguous).

3-10. TEST TERMINAL GRABBER CONNECTORS

3-11. Five test-terminal grabber-connectors are supplied with the 5004A. The grabbers are push-on pull-off connectors. A grabber can be used on the end of the active test pod test leads to make reliable electrical connections from the 5004A to the instrument being tested. *Figure 3-1* shows grabbers connected to the pod test leads. *Figure 3-4* shows grabbers connected to a device being tested. The removeable ground (common) test lead for the probe also has a grabber.



Figure 3-1. Front Panel, Probe, and Pod Features

FRONT PANEL FEATURES

1. FOUR-DIGIT DISPLAY: Shows the unique signaure stimulated by the input signals.
2. GATE Lamp: Regular blinking of GATE lamp indicates proper START/STOP gating signals.
3. UNSTABLE SIGNATURE Lamp: Intermittent or occasional blinking of this lamp indicates a difference between successive signatures inputted to the 5004A.
4. PROBE TEST Connector: Test point for 5004A data probe in SELF-TEST mode.
5. DATA PROBE: Point of entry for data from unit being tested by 5004A. Lamp near probe tip indicates logic level at tip: On Bright = High, On Dim = Bad-level, Off = Low, 10 ns or greater pulses are stretched to 100 ms. Note side ground connector for fast circuits and RESET switch.
6. START Test Point: Test point for the START test connector on the active pod in the SELF-TEST mode.
7. STOP Test Point: Test point for the STOP test connector on the active pod in the SELF-TEST mode.
8. CLOCK Test Point: Test point for the CLOCK test connector on the active pod in the SELF-TEST mode.
9. Active Test Pod: Four test inputs START, STOP, CLOCK, and a common GND (ground) are extended with this active pod for fast rise time signals and low circuit loading.

(A) START Test Lead: Point of entry for START signal from the unit being tested by the 5004A.

(B) STOP Test Lead: Point of entry for STOP signal from the unit being tested by the 5004A.

(C) CLOCK Test Lead: Point of entry for CLOCK signal from the unit being tested by the 5004A.

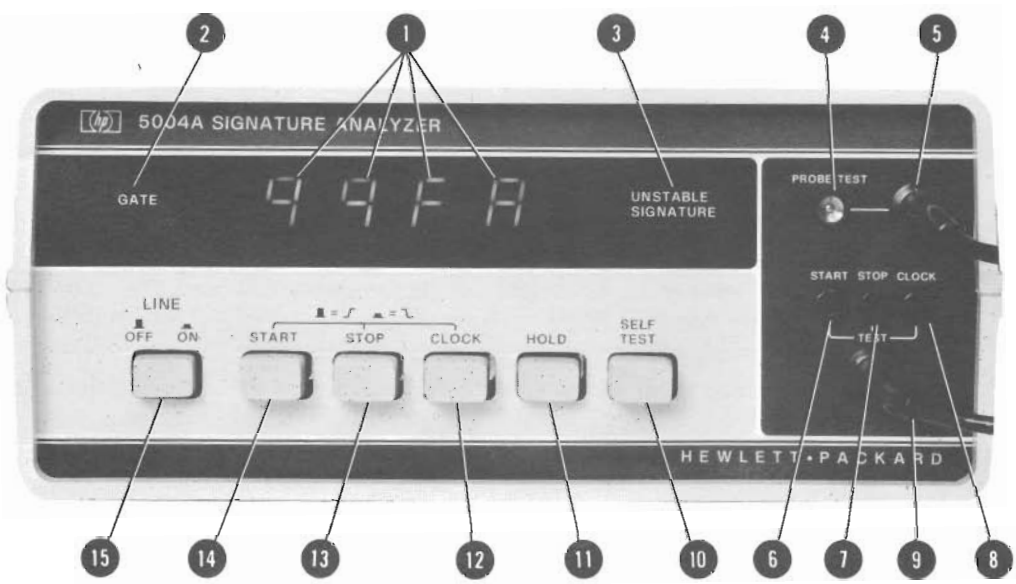
(D) GND Test Lead: Common (ground) test lead for connection to unit being tested by the 5004A.

SWITCH NOTE

The following six switches 10, 11, 12, 13, 14, and 15 are all pushed once to lock in-on and push again to release out-off switches.

10. SELF-TEST Switch: When pushed and locked in, this test puts the 5004A in the SELF-TEST mode. (See SWITCH NOTE above.)
11. HOLD Signature Switch: When pushed and locked in, this switch will hold a single, one-time signature for comparison or recording. (See SWITCH NOTE above.)
12. 13. 14. CLOCK, STOP, and START Switches: These three switches are set to select either the positive-going (▁▁▪▕▔) (indicates switch position) transition or the negative-going (▔▔▪▏▁) (indicates switch position) transition of the respective signals as the active control for that signal. The CLOCK, STOP, and START switches are respectively the active control switches for the CLOCK, STOP, and START test inputs on the active pod. (See the SWITCH NOTE.)
15. LINE OFF ON Switch: (Indicates switch position.) This switch controls application of mains line power to the 5004A. Line power is applied when the switch is pushed and locked in. Line power is disconnected when the switch is out. (See SWITCH NOTE.)
16. Handle-Stand: The combination handle and stand can be rotated by pulling gently at the side pivot points both sides simultaneously and turning the handle to the desired position.

Figure 3-1. Front Panel, Probe, and Pod Features (Continued)



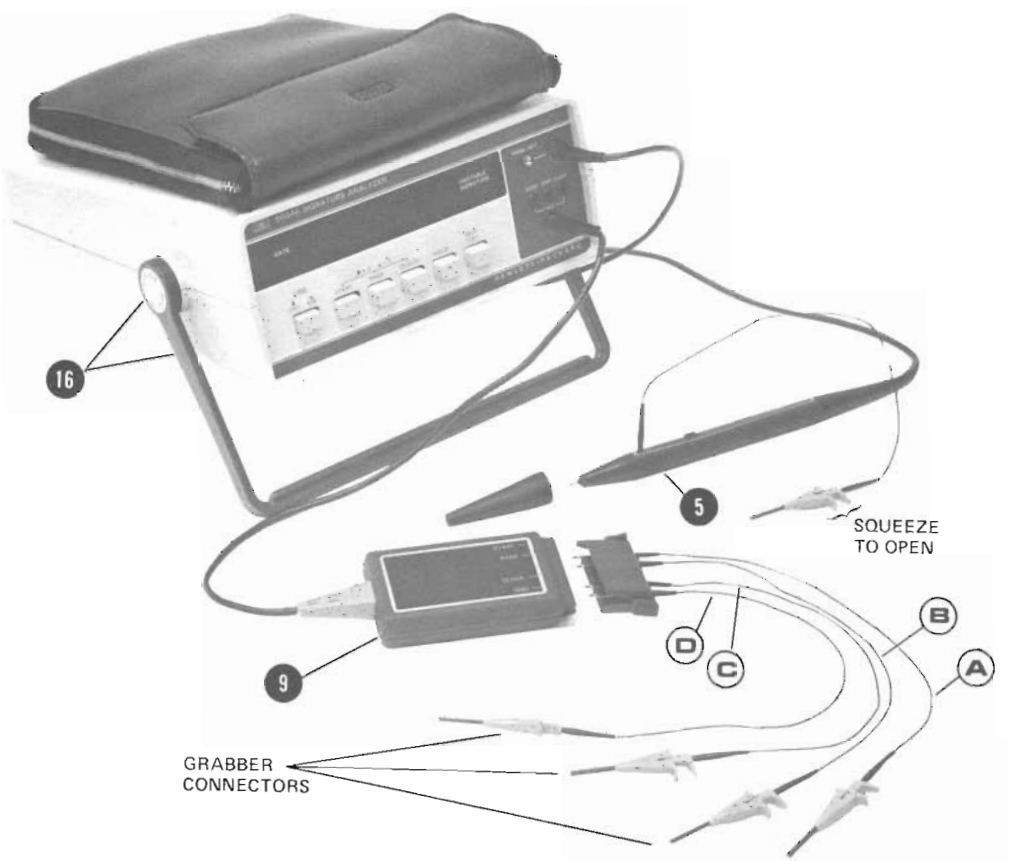


Figure 3-2. Operator Self-Test

3-12. OPERATOR'S MAINTENANCE

3-13. There are no operator's maintenance procedures for the 5004A.

FUSE NOTE

The 5004A power line fuse is inside the cabinet. If a 5004A seems to NOT operate as if a fuse were blown refer the unit to qualified maintenance personnel.

3-14. OPERATOR SELF-TEST of 5004A

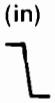
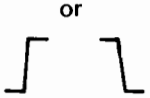
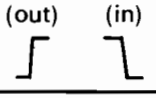
3-15. The 5004A Signature Analyzer has a SELF-TEST (front panel switch) mode which can be used to check the condition of the unit thoroughly. Use the procedure in *Figure 3-2* to SELF-TEST a 5004A.

1. Before applying power to the 5004A check that the line (mains) voltage available matches the label on the 5004A rear panel.

CAUTION

THE 5004A HAS INTERNALLY-SWITCHABLE OPTIONAL DIFFERENT POWER LINE VOLTAGES. REFER TO SECTION V FOR LINE VOLTAGE CHANGE PROCEDURE.

2. Remove the grabber connectors from the pod test leads, and connect the pod (START, STOP, and CLOCK) leads to the matching START, STOP, and CLOCK receptacles on the 5004A front panel.
3. Connect the 5004A data probe to the PROBE TEST receptacle on the 5004A front panel. Push the probe tip point gently and firmly into the PROBE TEST receptacle until the point is held securely.
4. Connect the 5004A power cable to the correct power source and set the 5004A front panel as follows for the displays shown:

Switch Settings			Displays			
START	STOP	CLOCK	Four Seven-Segment (See Note)	GATE	UNSTABLE SIGNATURE	PROBE TIP LIGHT
(in) 	(in) 	or 	UP73 then ACA2	flickers	Flickers except when good signature is on	Flickers when "ACA2" is on
(out) 	(out) 	or (out) (in) 	3951 then 2P61	flickers	Flickers except when good signature is on	Flickers when "2P61" is on

NOTE

In SELF-TEST mode, the four 7-segment displays first have all seven segments lit dimly, 8 , for about 1-second (tests all segments) and then have one of the signature sets listed above for about 1-second. If the probe RESET switch is pressed during the SELF-TEST mode, the four 7-segment-digit displays will show 0 000 (all zeroes) except when all segments are dimly lit 8 8 8 8

CAUTION

THE 5004A HAS INTERNALLY-SWITCHABLE OPTIONAL DIFFERENT POWER LINE VOLTAGES. REFER TO SECTION V FOR LINE VOLTAGE CHANGE PROCEDURE.

Figure 3-2. Operator Self-Test (Continued)

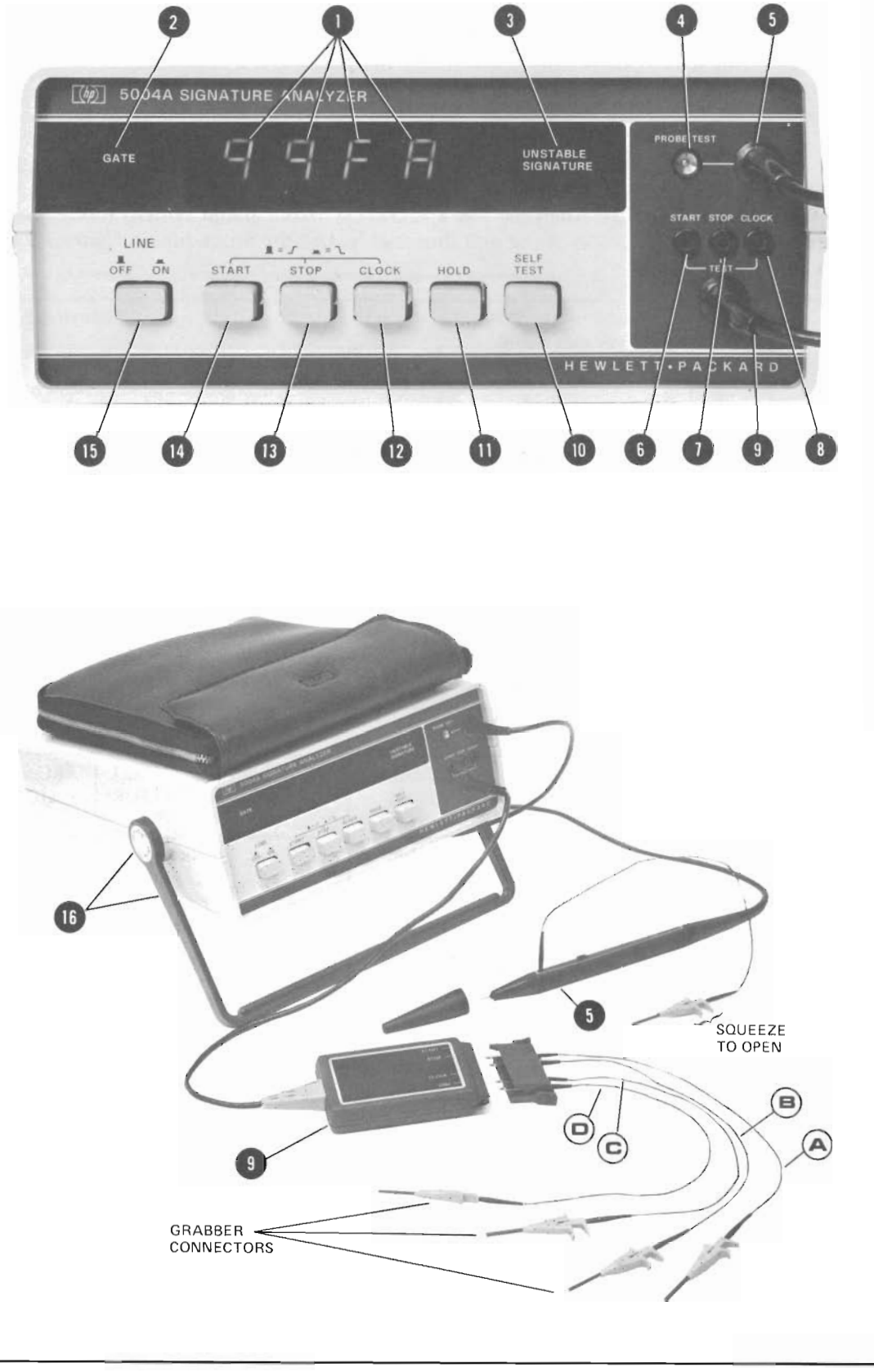


Figure 3-3. Operating Instructions

3-16. INSTRUMENTS COMPATIBLE WITH 5004A

3-17. The 5004A is used to check the operation of electronic digital logic instruments with built-in capability to be tested with the signature analysis method. Instruments to be checked by the 5004A must be compatible with the 5004A. Refer to the specifications and other details in Section I of this manual for compatibility information.

3-18. OPERATING INSTRUCTIONS

3-19. *Figure 3-3* shows operating procedures for the 5004A Signature Analyzer. Refer to the instruction manual of the instrument to be tested for detailed steps for use of the 5004A Signature Analyzer.

OPERATING INSTRUCTIONS

1. Before applying power to the 5004A study and learn the information given in *Figure 3-1,* Front Panel Features and perform the Operators Self-Test in *Figure 3-2.*
2. Refer to the instruction manual for the instrument or system to be tested.

NOTE

Correct (expected) "signatures" for the device under test (D.U.T.) must be known for proper use of the 5004A. Signatures will usually be in the troubleshooting section of the D.U.T. manual.

3. Connect the 5004A START, STOP, CLOCK, and GND test inputs (9) on the test pod to the specified test points of the D.U.T. (Refer to D.U.T. manual.)
4. Set the 5004A front panel START (14), STOP (13), and (12) CLOCK ▮= ⎍ ▮= ⎎ (edge select) switches as stated in the D.U.T. manual.

NOTE

The edge select switches allow flexibility in selection of START and STOP signals. For example, one long pulse can be used for both START and STOP if the rising edge is START and the falling edge is STOP.

NOTE

The (11) HOLD and (10) SELF-TEST switch buttons should normally be in the out position.

5. Use the 5004A Data Probe (5) to check the signature nodes of the D.U.T., and compare the signatures found with the signatures given in the D.U.T. manual.

NOTE

Especially when slow clock signals are used, the first one or two signatures displayed may be wrong. Two successive identical signatures indicate the signature of that point.

6. If one or more incorrect signatures are found, refer to the troubleshooting procedures in the DUT manual.

NOTE

If most or all signatures are incorrect, check the preliminary settings given in the DUT manual.

NOTE

Using the HOLD function (HOLD switch (11) in) allows observation of a signature occurring once. (The DATA PROBE (5) RESET switch will erase a HELD signature.)

Figure 3-3. Operating Instructions (Continued)

3-20. TYPICAL CONNECTIONS OF 5004A TO DEVICE UNDER TEST

3-21. *Figure 3-4* shows the 5004A Signature Analyzer connected to another device to take "signatures"

CAUTION

The black finned heat sink on the rear of the cabinet is "grounded" (connected) to the power line "earth" terminal.

NOTE

The bottom of the 5004A is insulating plastic material so it will not cause any electrical short circuits.



Figure 3-4. Typical Connections of 5004A to Device Under Test

3-22. PROBE, POD, AND POWER CABLE STORAGE

3-23. *Figure 3-5* shows the gating signals pod, data probe, line power cable in the recommended storage positions. The storage case on top of the 5004A should be used to store these components when the 5004A is not in use or is being transported.

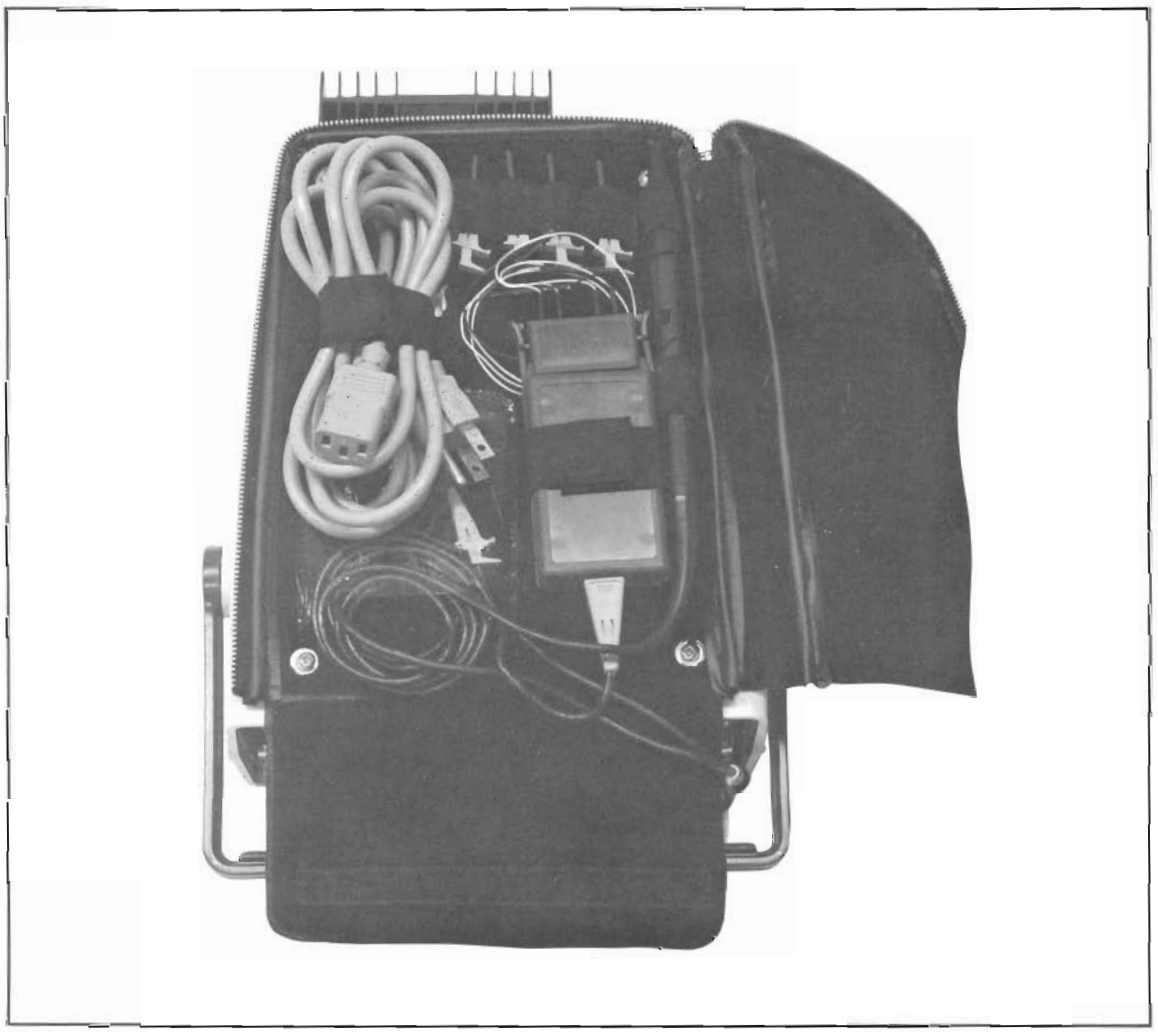


Figure 3-5. Probe, Pod, and Power Cable Storage

3-24. TROUBLESHOOTING WITH THE 5004A SIGNATURE ANALYZER

3-25. Digital instruments designed to be serviced with Signature Analysis will have a listing of correct signatures available either in a service manual or in some other form (e.g., a listing of correct signatures and conditions could be printed on an instrument top or bottom cover, or on a card inside the cabinet). Whatever form the list takes the Signature Analyzer can be used in much the same manner as a meter or oscilloscope to trace correct signals.

NOTE

A system with signatures will usually be setup so data paths can be signature checked in "signal tracing" fashion.

3-26. The traditional "half-split" method of signal tracing can be used with a Signature Analyzer.